Certification Approval for JSC Government Furnished Equipment (GFE) and Extravehicular Activity (EVA) Equipment

NT/Flight Equipment Division

September 19, 2001
Revision B

Verify that this is the correct version before use

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas

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September 19, 2001

Approved by

Original Signed by
Vincent D. Watkins
Government Furnished Equipment Branch Chief

Change Record

Revision	Date	Originator/Phone	Description
Baseline	03/27/1997	Greg Wright 483-2319	Baseline Release
Re-Baselined as NT3-GFE-007	04/27/1998	MLC	Administrative Change: Work instruction baselined as a new document with the following changes as a result of SR&QA Reorganization 3/2/98: • Number changed from NS-23-CER-001, Baseline to NT3-GFE-007, Baseline • New Signature obtained • Text changed to reflect new SR&QA organization structure and responsibilities.

NT3-GFE-007
 	
PCN-1
	04/27/1998
	
	02/02/1999
		Greg Wright
		483-2319
		
		Steve Schenfeld
		483-4083
			Baseline Release
			
			Changes made per request from Steve Schenfeld and marked with change bars:
			• Author Change from Greg Wright to Steve Schenfeld.
			• Changes in Sections 2, 3, 10.1, 10.2, and 10.7 as follows:
			  • Changed form name from SMACAR to GCAR.
			  • Changed SMACAR, S&MA certification approval request to GCAR, Government certification approval request.
			• Removed last sentence in section 10.6 (n/a after reorg): "If any issue cannot be resolved, the SSE presents the issue to the SMART for resolution.

A	02/04/2000	Steve Schenfeld 483-4083	Major revision. Due to complete rewrite change bars were not used. • Changed Purpose and Scope to clarify. • Changed definition for certification and GCAR. Added definition for acceptance, CDP, ADP. Deleted definition for limited life item and subsystem engineer. • Added CDP quality record • Changed Responsibilities for clarification. • Renumbered the procedure.

Revision	Date	Originator/Phone	Description
			• Added additional information (10.0) for development organization activities. • Added steps for updating the certsafe database as part of this procedure. • Added additional detail on SR&QA review requirements. • Added information on previouse form title for JF1296 to clarify modification to existing data contained on previous form, and continued use of previouse form. • Deleted appendix A "Related Documents."
GFE-007 Baseline	07/27/2000	NT MLC	Baseline Release • This procedure replaces the previous NT Work instruction for this task and has been numbered as such. (See the *NT Handbooks Procedure Numbering Matrix* for more information: http://wwwsrqa.jsc.nasa.gov/iso9000/nt/Numbering-Matrix) Note: Technical changes have not been made during this data restructure unless otherwise noted in this change record.
PCN-1	01/15/2001	NT MLC Charles R. (Chuck) Bailey 244-5093	• Removed from handbook configuration and returned to individual UWI template. • Branch removed from WI number for portability. • Author changed to Chuck Bailey.
A	07/09/2001	Chuck Bailey 244-5093	• Incorporated NT-EVA-002, *Certification Approval for Extravehicular Activity (EVA) Hardware.*
PCN-1	07/30/2001	NT MLC	Editorial change: ▪ Corrected spelling of "Johnson" in header.
B	09/19/2001	Charles R. (Chuck) Bailey 244-5093	Section 10.1: ▪ Update the certification criteria in section 10.1 due to a process change.

1 PURPOSE

This procedure is used by SR&QA engineers when reviewing and approving JSC certification data packages.

2 SCOPE

This procedure covers the certification data package content and review requirements for JSC GFE and EVA equipment.

The Project Management Plan, Internal Task Agreement, or other program approved equivalent plan/agreement for a flight project may define additional or different activities and deliverables necessary to achieve flight certification. Customer/sponsor requirements defined in these approved plans/agreements take precedence when there is a conflict with this procedure.

3 DEFINITIONS, ACRONYMS, and TERMS

Acceptance: That verification activity performed to show a specific end item, tracked by serial number, or unique firmware and/or software identifier, has successfully complied with the end item design requirements.

- From the Federal Acquisition Regulation (FAR) - "Acceptance," as used in this part, means the act of an authorized representative of the Government by which the Government, for itself or as agent of another, assumes ownership of existing identified supplies tendered or approves specific services rendered as partial or complete performance of the contract.
- Acceptance is performed on each deliverable end item, including the qualification unit. In addition to proving the functionality of each unit at defined specification values, acceptance testing also is intended to screen out manufacturing defects, workmanship errors, incipient failures, and other functional anomalies not readily detectable by inspection. Acceptance provides the assurance that the manufacturing and assembly processes continue to provide products equivalent to the design that was qualified. The acceptance testing process also ensures the verified firmware and/or software resident within the system has been properly loaded into the appropriate end item.

Certification: The process whereby a NASA certifying official signs the certification approval request, which approves the certification. This includes the process of obtaining, producing, reviewing, and approving objective evidence that design, production, safety, and acceptance processes provide products that consistently meet customer requirements. Certification approval is mandatory for all flight projects.

NOTE: Certification is for a specific configuration of hardware or software. Part number and dash number for hardware and version number for software define the configuration. Certification approves the design, manufacturing processes, acceptance requirements, flight processing requirements and operation for all end items of that configuration. If you change the configuration of an end item, you must certify the new configuration.

Certification Data Package (CDP): The CDP contains, by inclusion or reference, all information needed to provide objective evidence that the design meets the requirements. The CDP contains information pertaining to the acceptance and qualification activity for the qualification unit. The CDP is made up of one or more notebooks with index tabs and contains, at a minimum, the following items:

- Hard and soft-copy of the Government Certification Approval Request (GCAR) (JSC Form 1296) (See http://wwwsrqa.jsc.nasa.gov/gcars/ for additional information and instructions)
- Verification and Validation plan, or customer approved equivalent, with annotated Verification Matrix
- Risk assessment documents (e.g. hazard analysis, failure modes and effects analysis (FMEA), etc.) (A Risk Assessment Executive Summary Report contains both FMEA and hazard analysis)
- Materials Certification, and as needed the Fracture Control Report and Materials Usage Agreement
- Engineering Analysis Reports (for example, Stress analysis, thermal analysis Electrical, Electronic, and Electromechanical (EEE) Parts Stress Analysis/De-rating Analysis, etc.)
- Acceptance Test Reports (for qualification unit)
- Qualification Test Reports
- Waivers and deviations
- Discrepancy Reports and Problem Closure Reports (for qualification unit)
- Limited Life Items List (or Limited Life Document)
- Top Assembly Drawing and other Select Engineering Drawings
- Project Technical Requirements Specification
- Approved Change Request to the Project Technical Requirements Specification
- Listing of Project Approved Operational Controls
- Structural Integrity Verification Plan (if separate from verification and validation plan)

  NOTE: Revisions, changes, or updates to certification data packages may contain only that data which is required to provide information related to the change from the original package. Reference to the certification data package containing this information is required to allow audit of the complete set of data.

EVA: Extra Vehicular Activity

GFE: Government Furnished Equipment

Government Certification Approval Request (GCAR) – [JSC Form 1296]: The form used by the JSC GFE development organization to request flight certification approval after the completion of verification activities. The GCAR is the approval form and summary information for the certification data package.

Limited-Life Item. Any item designated as having a total life of less than the hardware life requirement, regardless of whether the item has a limited shelf life or limited operating life, is time action control sensitive, or a combination of these. This includes, where appropriate, fluids, elastomers and polymers, and bearing and parts subject to wear. Any item, except the extravehicular mobility unit (EMU), projected to have a life of 100 mission and 10 years is not considered life limited. The design life of the EMU is 15 years and 100 missions; therefore, any EMU item projected to have useful life below the design life is considered to be life limited.

Project Technical Requirements Specification (PTRS): The PTRS is the document that defines the requirements that a project must meet to satisfy the customers needs. A PTRS may be a unique document for a project, or may be a generic requirements document such as JSC 28484 "Program Requirements Document for JSC non-critical GFE." PTRS is the generic term used in this procedure when describing the document that controls the requirements agreed to by the customer/sponsor, the project team, and SR&QA. Projects that use a term other than PTRS may substitute that term for PTRS when following this procedure.

Risk Assessment Executive Summary Report (RAESR): A report used to document the results of the hazard analysis and the failure modes and effects analysis. Projects that use separate documents for the hazard analysis and the FMEA should consider the RAESR as a single document containing the combined information from both of those documents. See NT-GFE-012, for additional information.

4 QUALITY RECORDS AND FORMS

4.1 Quality Records

Certification Data Package

4.2 Other Records

JSC Form 1296, Government Certification Approval Request

5 SAFETY PRECAUTIONS AND WARNING NOTES

None

6 REFERENCES

NT-GFE-012, *Preparation of Risk Assessment Executive Summary Report (RAESR) and Risk Reports*

JSC 28484, *Program Requirements Document for JSC non-critical GFE*

7 TOOLS, EQUIPMENT AND MATERIALS

None

8 PERSONNEL TRAINING AND CERTIFICATION

None

9 RESPONSIBILITIES

SR&QA engineers assigned to reviewing or approving certification information for a JSC flight project are responsible for following this process.

10 PROCEDURE

The flight project development organization completes verification activities necessary to provide evidence that the flight project satisfies the project technical requirement specification, risk assessment documentation, interface control documents, and as applicable, the project management plan.

a. The development organization:
   1. Prepares certification and acceptance requirements
   2. Establishes verification methods for each requirement
   3. Establishes pass/fail criteria for each method
   4. Produces a verification matrix
   5. Establishes a sequence of verification activity
   6. Produces a verification plan
   7. Produces verification procedures
   8. Performs the verification methods

b. The development organization compiles the verification data, obtained from completion of the above, into a certification data package (CDP). The development organization obtains any concurrence signatures needed, signs the GCAR, and provides the CDP to SR&QA for review and approval.

   NOTE: Much of the information contained in the CDP is available for review during the design and development life cycle. As a proactive SR&QA engineer, we expect you to review this information as it becomes available. This ensures early detection of any failure to comply with requirements and decreases the time needed to review the final certification package.

10.1 As an SR&QA engineer assigned to reviewing and approving certification data, you perform the following steps:

a. Update the certsafe database to indicate the submittal date. Update certsafe weekly if there are changes to the certification status or as issues are resolved.

b. Assure that the CDP contains evidence that the as-built design meets all requirements for the hardware. *[It is acceptable for the developing organization to reference data contained in another certification data package instead of creating a duplicate record. When this is the case, the developing organization must clearly state in the CDP the location of the reference data to allow retrieval of the data]*. To do this, evaluate each requirement against the verification data provided. Assure that the verification data indicates that the requirement was satisfied. These requirements come from three areas:
   1. Project Technical Requirement Specification (PTRS)
   2. Interface control document(s)
   3. Hazard and FMEA verifications identified in the RAESR

   NOTE: During the design phase, the development organization should have produced a verification matrix that provides the correlation between the requirements and the verification data. You are responsible for assuring that the verification matrix is correct and complete.

c. Assure that the hazard control verification method is complete and implemented in the acceptance and flight processing documentation. In addition to evaluating if the design met the requirements, you are responsible for assuring that the acceptance requirements for future flight units and flight processing will continue to provide evidence that the hazards remain controlled. Verify that all Hazard Report verifications are closed and all Non-Compliance Requests have been reviewed by the next higher level panel and signature by the program is recommended.

d. Assure that the failure modes verification method is complete and implemented in the acceptance and flight processing documentation. In addition to evaluating if the design met the requirements, you are responsible for assuring that the acceptance requirements for future flight units and flight processing will continue to provide evidence that the failure modes remain controlled. Any Critical Item Lists must be signed before certification.

e. Assure that all data blocks on the hard copy and soft copy GCAR are accurate.

   NOTE: The SMACAR (Safety and Mission Assurance Certification Approval Request), the previous title and version for JSC Form 1296, was changed to GCAR in 1997. Certification data packages approved before the revision, and those in work at the time of the form change, contain SMACARs instead of GCARs. There is no requirement to transfer the existing data onto the new form. Any change to a certification such as extension, revision, or expansion, may be made to the existing SMACAR when it is cost and schedule prohibitive to develop a GCAR. New certifications and configuration changes with significant data changes shall be submitted on a GCAR.

f. Document any issues or comments and facilitate resolution of them. During your review performed in the previous steps, document all issues as you identify them, and try to resolve them with the development organization. Follow normal management instructions for resolution of issues.

g. Sign the GCAR and provide the CDP to the certification records center.

h. Update the certsafe database as applicable.

11 FLOW DIAGRAM

None